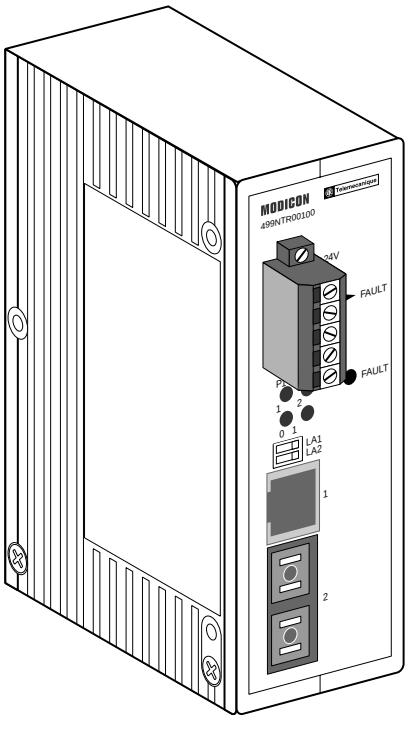
ETHERNET CABLING SYSTEM

Quick Reference Guide

ETHERNET TRANSCEIVER 100 Mbps TX/FX
Fast ETHERNET Transceiver
Media converter 100BASE-TX/100BASE-FX
for ISO/DIN Rail

Order No.

499NTR00100



The media converter Ethernet transceiver 100 Mbps TX/FX enables media transition from 100BASE-TX (twisted pair cabling) to 100BASE-FX (fiber optic).

The module conforms to the specifications of IEEE 802.3 respectively ISO/IEC 8802-3.

The media converter has a twisted pair (TP) interface (RJ45 socket) and an optical interface (SC). Through TP port, other TP components can be attached (Hub Ethernet 100 Mbps 4TX, Switches Ethernet 10/100 Mbps 5TX/2FX, 7TX…). The FL port offers connection to optical network (Ethernet Switch 10/100 Mbps 5TX/2FX,…).

Monitoring LEDs for:
- Power,
- RxData,
- Link status,
- Fault.

Link status monitoring can be disabled.

Operation in industrial area.

Mounting on ISO/DIN rail.

Low current consumption.

Compact construction.

You will find a detailed description for construction of a local area network in network design and network installation in the “Ethernet Reference Manual” (Order no. 490USE13300).

Merlin Gerin
Modicon
Square D
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We have checked that the contents of the technical publication agree with the hardware and software described. However, it is not possible to rule out deviations completely, so we are unable to guarantee complete agreement. However, the details in the technical publication are checked regularly. Any corrections which prove necessary are contained in subsequent editions.

We are grateful for suggestions for improvement.

We reserve the right to make technical modifications.

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Note

We would point out that the content of these operating instructions is not part of, nor is it intended to amend an earlier or existing agreement, permit or legal relation-ship. All obligations on Schneider Automation arise from the respective purchasing agreement which also contains the full warranty conditions which have sole applicability. These contractual warranty conditions are neither extended nor restricted by comments in these operating instructions.

We would furthermore point out that for reasons of simplicity, these operating instructions cannot describe every conceivable problem associated with the use of this equipment. Should you require further information or should particular problems occur which are not treated in sufficient detail in the operating instructions, you can request the necessary information from your Schneider Electric regional sales office.

General

Electricity is used to operate this equipment. Comply in every detail with the safety requirements specified in the operating instructions regarding the voltages to apply!

Warning
If warning notices are ignored, severe injury and/or material damage may occur.

Only appropriately qualified staff should work on or near this equipment. Such staff must be thoroughly acquainted with all the warnings and maintenance measures contained in these operating instructions.

The proper and safe operation of this equipment assumes proper transport, appropriate storage and assembly and careful operation and maintenance.

Staff qualification requirements

Qualified staff within the meaning of these operating instructions or the warning notes are persons familiar with setting up, assembling, starting up and operating this product and who have appropriate qualifications to cover their activities, such as:

- training or instruction/entitlement to switch circuits and equipment/systems on and off, ground them and identify them in accordance with current safety standards;
- training or instruction in accordance with current safety standards in looking after and using appropriate safety equipment;
- first aid training.

Safety guidelines

Warning
Ethernet Transceiver 100 Mbps TX/FX units are designed for operation with safe extra-low voltage. Accordingly, only safe extra-low voltages (SELV) conforming to IEC950/EN60950/VDE0805 may be connected to the supply voltage connections.

1. Functional description

1.1 GENERAL FUNCTIONS

Signal regeneration
The Transceiver 100 Mbps TX/FX processes the signal shape and amplitude of the data received.

1.2 SPECIFIC FUNCTIONS OF THE TP INTERFACE

Link control
The Transceiver 100 Mbps TX/FX monitors the connected TP line segments for short-circuit or interrupt using idle signals during frame pauses in accordance with IEEE standard 802.3 100BASE-TX. The Transceiver 100 Mbps TX/FX does not transmit any data in a TP segment from which it does not receive an idle signal.

Note: A non-occupied interface is assessed as a line interrupt. The TP line to terminal equipment which is switched off is likewise assessed as a line interrupt as the de-energised transceiver cannot transmit idle signals.

1.3 SPECIFIC FUNCTIONS OF THE F/O INTERFACE

Link control
The Transceiver 100 Mbps TX/FX monitors the connected F/O lines for interrupts using idle signals during frame pauses in accordance with IEEE standard 802.3 100BASE-FX. The Transceiver 100 Mbps TX/FX transmits no data to an F/O line from which it is receiving no idle signal.
Low Light Detection: If the optical input power decreases below the low light threshold the transmit and receive path will be disabled for data and the idle signal will be transmitted.

1.4 DISPLAY ELEMENTS

Equipment status
The LEDs provide information about the status which affects the function of the entire Transceiver 100 Mbps TX/FX.
P1 - Power 1 (green LED)
- lit: - supply voltage 1 present
- not lit: - supply voltage 1 not present,
  - hardware fault in Transceiver 100 Mbps TX/FX

P2 - Power 2 (green LED)
- lit: - supply voltage 2 present
- not lit: - supply voltage 2 not present,
  - hardware fault in Transceiver 100 Mbps TX/FX

FAULT - Fault (red LED)
- lit: - the indicator contact indicates error
  - the attached device is switched off,
  - the TP line is interrupted or short-circuited,
  - Transceiver 100 Mbps TX/FX hardware error.

Port status
These groups of LEDs display port-related information.
DA STAT 1 - Data and Link status TP-Port (Port 1) (green/yellow LED)
- lit yellow: Transceiver 100 Mbps TX/FX receives data on the TP interface

Depending on the network load the illumination of the LED can vary between flickering and continuous illumination.

- lit green: Transceiver 100 Mbps TX/FX receiving idle signals from the TP segment,
  - the attached TP segment works properly
- not lit: Transceiver 100 Mbps TX/FX not receiving idle signals from TP segment,
  - the assigned TP port is not attached,
  - the attached device is switched off,
  - the TP line is interrupted or short-circuited,
  - Transceiver 100 Mbps TX/FX hardware error.

DA STAT 2 - Data and link status of F/O port (Port 2) (green/yellow LED)
- lit yellow: Transceiver 100 Mbps TX/FX receiving data from F/O segment

Depending on the network load the illumination of the LED can vary between flickering and continuous illumination.

- lit green: Transceiver 100 Mbps TX/FX receiving idle signals from the F/O segment,
  - the attached F/O segment works properly
- not lit: Transceiver 100 Mbps TX/FX not receiving idle signals from F/O segment,
  - the assigned F/O port is not attached,
  - the attached device is switched off,
  - Low Light Detection
  - the receive F/O line is interrupted,
  - Transceiver 100 Mbps TX/FX not receiving data at the interface,
  - Transceiver 100 Mbps TX/FX hardware error.

Data transmission
The Transceiver 100 Mbps TX/FX supports half duplex (HDX) and full duplex (FDX) connections. Changing the configuration is not necessary.

1.5 CONTROLS

2-pin DIP switch
Using the 2-pin DIP switch on the Transceiver 100 Mbps TX/FX front panel
- the message about the link status can be suppressed by the indicator contact on a port-by-port basis. Using switch LA1, the message about the link status of the TP port (port 1)is suppressed, using switch LA2, the message about the link status of the F/O port (port 2) is suppressed. State of delivery: switch position 1 (ON), i.e. message not suppressed, the indicator contact passes the faulty link status.

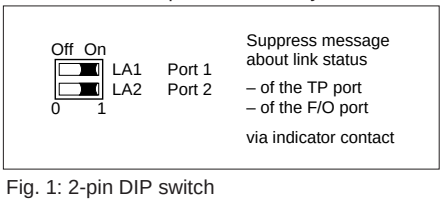


Fig. 1: 2-pin DIP switch

1.6 INTERFACES

TP connection
One 8 pole RJ45 socket enables an independent TP segment to be connected. The housing of the socket is electrically connected to the front panel.

- Pin configuration of the RJ45 socket:
- TD+: Pin 3, TD-: Pin 6
- RD+: Pin 1, RD-: Pin 2
- remaining pins: not configured.

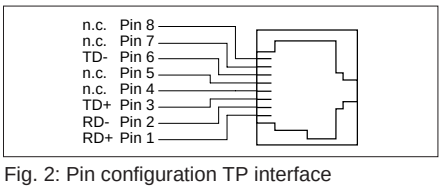


Fig. 2: Pin configuration TP interface

F/O connection
One optical port conform to 100BASE-FX (SC socket) enables terminal devices or optical network components to be connected.

5-pin terminal block
The supply voltage and the indicator contact are connected via a 5-pin terminal block with screw locking mechanism.

Warning

The Transceiver 100 Mbps TX/FX equipment is designed for operation with SELV. Only safe extra-low voltages to IEC950/EN60950/VDE0805 may therefore be connected to the supply voltage connections and to the indicator

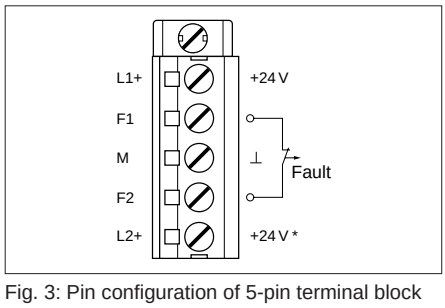


Fig. 3: Pin configuration of 5-pin terminal block

- Voltage supply: The voltage supply can be connected to be redundant. Both inputs are decoupled. There is no load distribution. With redundant supply, the power pack supplies the Transceiver 100 Mbps TX/FX alone with the higher output voltage. The supply voltage is electrically isolated from the housing.

- Indicator contact: Contact interrupt indicates the following by means of a volt-free indicator contact (relay contact, closed circuit):
- the failure of at least one of the two supply voltages.
- a permanent fault in the transceiver (internal 5 V DC voltage, supply voltage 1 or 2 not within the permissible range).
- the faulty link status of the TP port (port 1), if the setting of DIP switch LA1 is “ON”.
- the faulty link status of the F/O port (port 2), if the setting of DIP switch LA2 is “ON”.
  The indication of the link state might be masked on a port-by-port basis using the DIP switches LA1 and LA2.

The indicator contact is closed,
- if the power supply is OK.
- if the setting of DIP switch LA1 is “ON” and the link status of port 1 is OK (or if the setting of DIP switch LA1 is “OFF”).
- if the setting of DIP switch LA2 is “ON” and the link status of port 2 is OK (or if the setting of DIP switch LA2 is “OFF”).

Note: In the case of the voltage supply being routed without redundancy, the Transceiver 100 Mbps TX/FX indicates the failure of a supply voltage. You can prevent this message by feeding in the supply voltage through both inputs.

2. Configuration

2.1 CONNECTING TO EXISTING NETWORKS
Terminal devices, programmable logical controls (PLC), automates etc. can be attached by interference insensitive F/O lines in the i ETHERNET area.

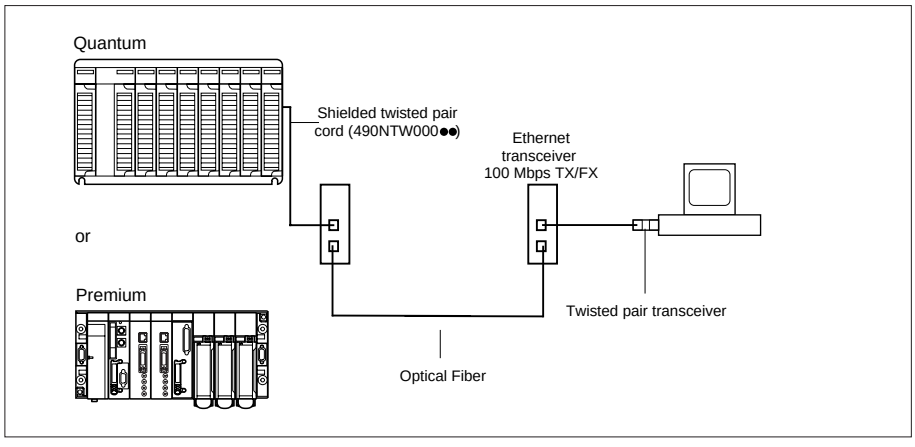
Via the transceiver 100 Mbps TX/FX terminal devices can be tied to existing 100 Mbit ETHERNET networks with:

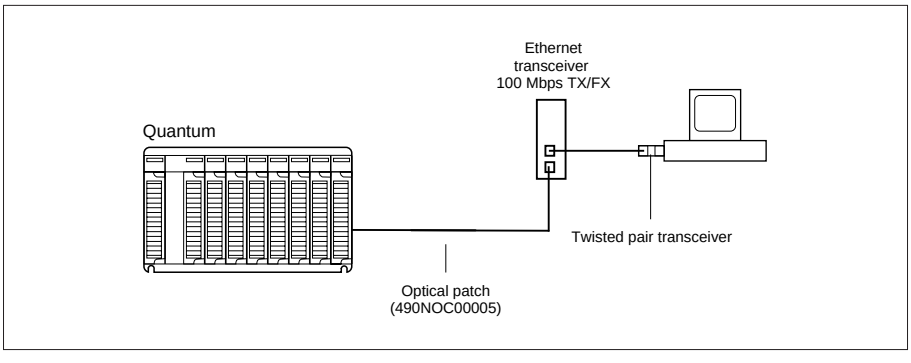
- Ethernet hub 100 Mbps 4TX,

- Ethernet switch 10/100 Mbps 7TX,

- Ethernet switch 10/100 Mbps 5TX/2FX.

The maximum number of cascaded transceiver 100 Mbps TX/FX between terminal devices or repeaters is two.





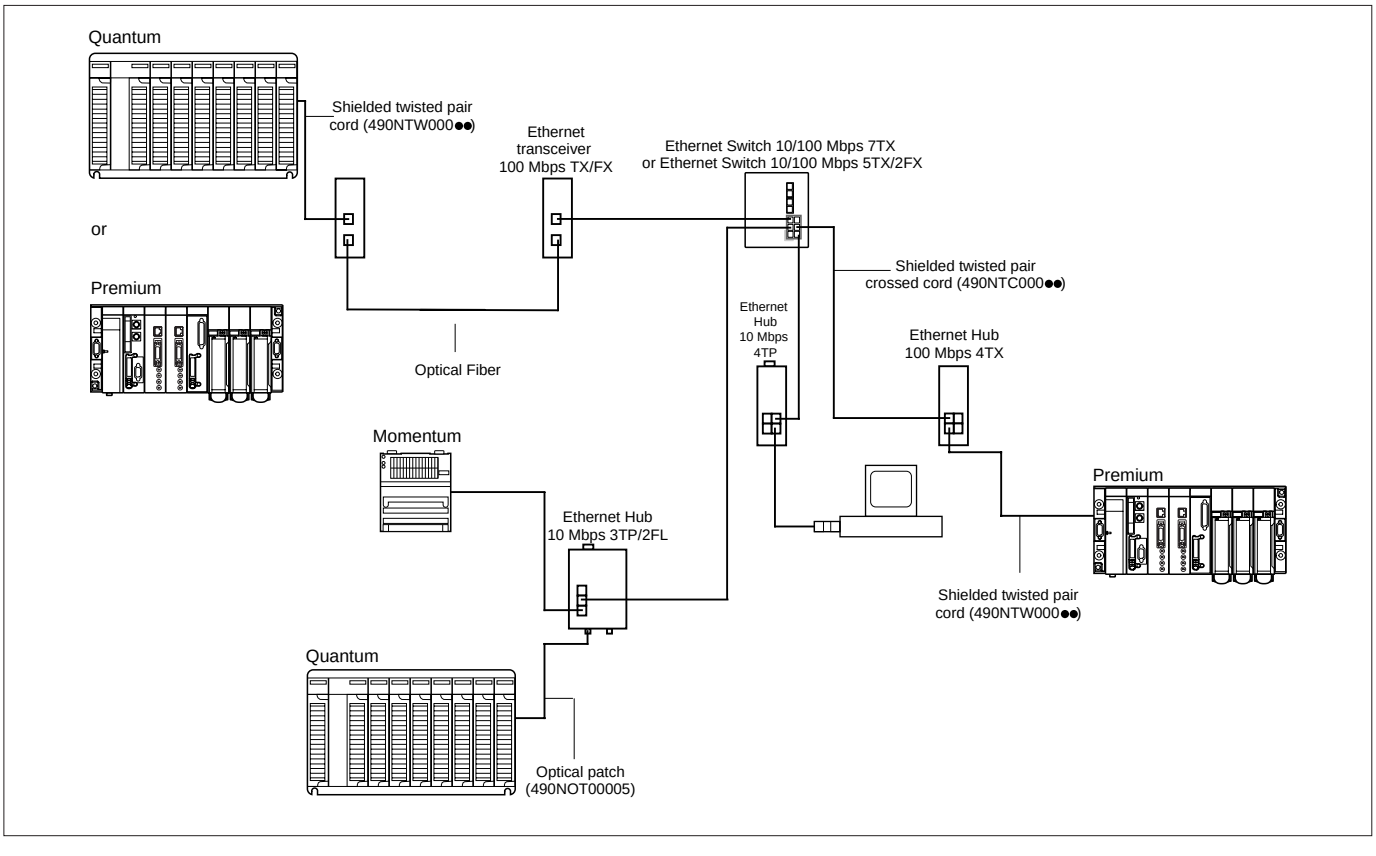


Fig. 4: Possibilities of Configuration

3. Assembly, startup procedure and dismantling

3.1 UNPACKING, CHECKING

- Check whether the package was delivered complete (see scope of delivery).
- Check the individual parts for transport damage.

Warning
Use only undamaged parts!

3.2 ASSEMBLY

The equipment is delivered in a ready-to-operate condition. The following procedure is appropriate for assembly:

- Check whether the switch factory-setting is suitable for your requirements.
- Pull the terminal block off the Transceiver 100 Mbps TX/FX and wire up the supply voltage and indicator lines.
- Fit the Transceiver 100 Mbps TX/FX on a 35 mm ISO/DIN rail to DIN EN 50 022.
- Suspend the upper snap-in hook of the Transceiver 100 Mbps TX/FX in the ISO/DIN rail, insert a screwdriver horizontally under the housing into the locking slide pull this downwards (see Fig. 6, dismantling) and press the bottom of the module onto the ISO/ DIN rail until it locks in position (Fig. 5).
- Fit the signal lines.

Notes:

- The front panel of the Transceiver 100 Mbps TX/FX is grounded via the separate ground connection in the front panel.
- The shielding ground of the twisted pair lines which can be connected is electrically connected to the front panel.

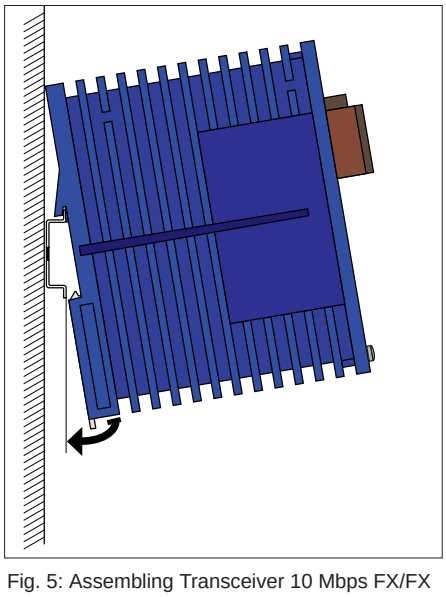


Fig. 5: Assembling Transceiver 10 Mbps FX/FX

3.3 STARTUP PROCEDURE

You start up the Transceiver 100 Mbps TX/FX by connecting the supply voltage via the 5-pin terminal block. Lock the terminal block with the locking screw at the side.

F/O-Line

For a F/O segment the Transceiver 100 Mbps TX/FX has one port with an SC socket.
The maximum length of an attached F/O segment is:

- 3000 m at 50/125 µm fiber type (Transceiver 100 Mbps TX/FX),
- 3000 m at 62.5/125 µm fiber type (Transceiver 100 Mbps TX/FX).

TP-Line

For a TP segment the Transceiver 100 Mbps TX/FX has one port with an TP socket.
The maximum length of an attached TP segment is 100 m.

Propagation delay with half duplex segments

Using half duplex segments the propagation delay between the terminal devices is 512 bit times (BT) maximum. Add all components of the signal path plus a safety margin.

Propagation delay in the signal path:

Components	Delay
Transceiver 100 Mbps TX/FX	84 BT
Class II Repeater	92 BT
DTE with TP connection	50 BT
DTE with F/O connection	50 BT
Cat. 5 TP cable	1.112 BT/m
F/O cable	1.0 BT/m
Security margin	4 BT

3.4 DISMANTLING

To take the Transceiver 100 Mbps TX/FX off the ISO/DIN rail, insert a screwdriver horizontally under the housing into the locking slide, pull it downwards and tilt the Transceiver 100 Mbps TX/FX upwards (Fig. 6).

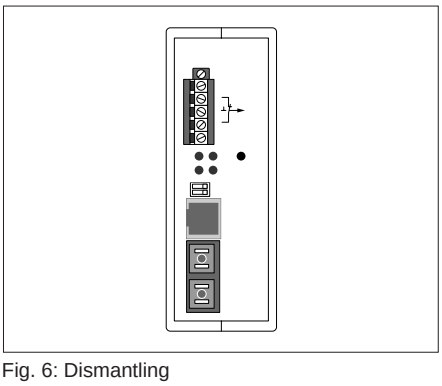


Fig. 6: Dismantling

4. Technical data

General data

Operating voltage	DC 9.6 to 57.6 V safe extra-low voltage (SELV) (redundant inputs decoupled)	
Current consumption	typ. 160 mA at 24 VDC max. 190 mA at 24 VDC	
Overload current protection at input	non-replaceable thermal fuse	
Dimensions W x H x D	47 mm x 135 mm x 111 mm	1.9 in x 5.3 in x 4.4 in
Weight	230 g	0.51 lb
Ambient temperature	0 ºC to + 60 ºC	32 ºF to + 140 ºF
Storage temperature	- 20 ºC to + 80 ºC	-40 ºF to + 176 ºF
Humidity	10% to 90% (non condensing)	
Protection class	IP 20	
Laser protection	Class 1 conform to EN 60825	
Radio interference level	EN 55022 Class A Warning! This is a Class A Equipment. This equipment may cause radio interference if used in a residential area; in this case it is the operator´s responsibility to take appropriate measures.	
Interference immunity	EN 50082-2	

Network size

Transition	TP port ↔ F/O port and F/O port ↔ TP port	
Propagation equivalent	2 x 42 BT = 84 BT	(1 BT = 10 ns)
TP line length (TP port ↔ TP port)		
Length of a twisted pair segment	max. 100 m	(328 ft)
F/O port		
According to IEEE 802.3u 100BASE-FX		
System attenuation		
50/125 µm fiber	8 dB	
62,5/125 µm fiber	11 dB	
Wave length	1300 nm	
F/O line length (example)		
50/125 µm fiber	3000 m (9843 ft) maximum	(data on fiber: 1.6 dB/km, 500 Mhz*km)
62,5/125 µm fiber	3000 m (9843 ft) maximum	(data on fiber: 2.6 dB/km, 500 Mhz*km)

Scope of delivery

Ethernet Transceiver 100 Mbps TX/FX incl. terminal block for supply voltage Quick reference guide	
Order number	
Ethernet transceiver 100 Mbps TX/FX	499NTR00100

Accessories

Ethernet SFTP cat5RJ45 cords	490NTW000●●
Ethernet SFTP cat5RJ45 crossed cords	490NTC000●●
Ethernet MTRJ/SC 5 m optical patch	490NOC00005
Ethernet MTRJ/ST 5 m optical patch	490NOT00005
Note: The optical patch is made up of two 62.5/12.5 multi mode glass fiber, used in 1300 nano-meter wavelengths.	
Ethernet reference Manual	490USE13300

CE **Notes on CE identification**
The devices comply with the regulations of the following European directive:

89/336/EEC
Council Directive on the harmonisation of the legal regulations of member states on electromagnetic compatibility (amended by Directives 91/263/EEC, 92/31/EEC and 93/68/EEC).

Area used	Requirements for emitted interference		interference immunity
Industrial	EN 50081-2: 1993	EN 55022 Class A: 1998	EN 50082-2: 1995

The product can be used in the residential sphere (residential sphere, business and trade sphere and small companies) and in the industrial sphere.

The precondition for compliance with EMC limit values is strict adherence to the construction guidelines specified in this description and operating instructions.

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